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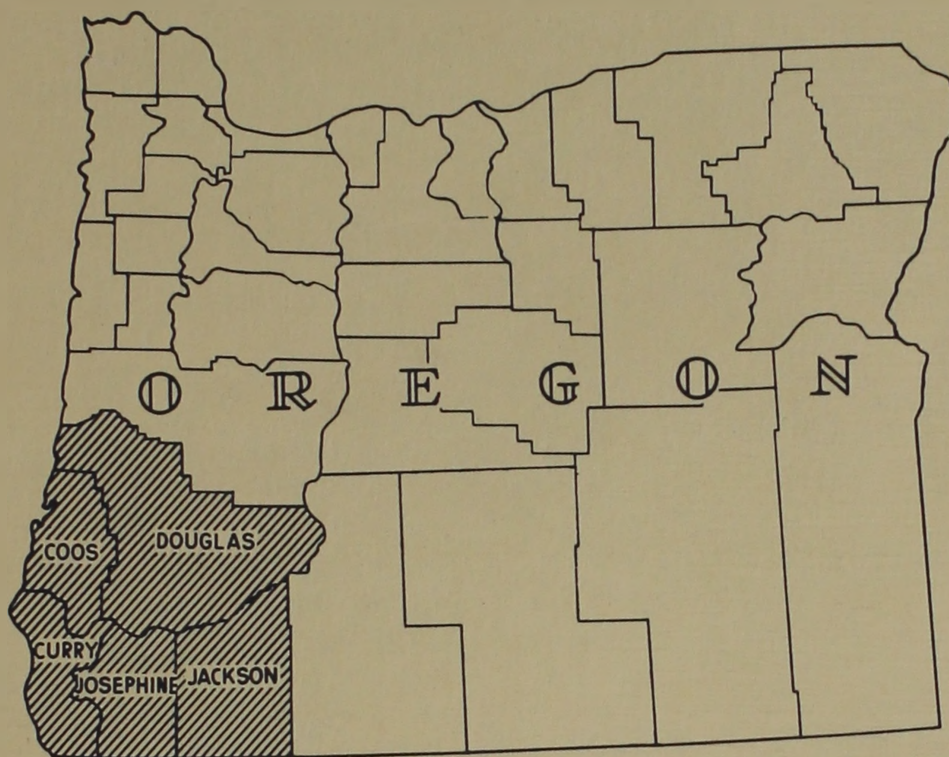
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FOREST STATISTICS
FOR
SOUTHWEST OREGON UNIT

FOREST SURVEY REPORT NO. 104

44



U. S. DEPARTMENT OF AGRICULTURE • FOREST SERVICE
PACIFIC NORTHWEST FOREST AND RANGE EXPERIMENT STATION

R.W. COWLIN, DIRECTOR

PORTLAND, OREGON
NOVEMBER 1951

mt

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FOREST STATISTICS
FOR
SOUTHWEST OREGON UNIT
Forest Survey Report No. 104
by
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U. S. Department of Agriculture Forest Service
Pacific Northwest Forest and Range Experiment Station

R. W. Cowlin, Director

Portland, Oregon
November 1951

FOREWORD

This publication summarizes in statistical form the results of a reinventory of the forests of the Southwest Oregon Unit--consisting of Coos, Curry, Douglas, Jackson, and Josephine Counties--conducted during the period 1947-49. This reinventory is a part of the maintenance phase of the Forest Survey, a Nation-wide project of the Forest Service authorized by the McSweeney-McNary Forest Research Act of 1928 and amended June 25, 1949. The sixfold purpose of the project is: (1) To make an inventory of the extent and condition of forest lands and of the present supply of timber and other forest products on these lands; (2) to ascertain the rate at which this supply is being increased through growth, and the potential growth on forest areas; (3) to determine the extent of depletion of the forests through cutting and through loss from fire, insects, disease, windthrow, and other causes; (4) to determine the present consumption and the probable future trend in requirements for timber and other forest products; (5) to analyze and correlate these findings with other economic data, as an aid in the formulation of private and public policies for most effective and rational use of land suitable for forest production, and (6) to make such resurveys as are necessary to keep the basic information up to date.

The Forest Survey is conducted in the various forest regions of the Nation by the regional forest experiment stations of the Forest Service. In the Pacific Northwest region of Oregon and Washington it is an activity of the Pacific Northwest Forest and Range Experiment Station at Portland, Oregon.

Under the initial phase of the Forest Survey the five southwest Oregon counties were inventoried during 1932 and 1933; a reinventory of Coos County was made in 1938. Results of the initial inventories and the one reinventory were released in statistical and analytical publications and through forest type maps of two scales: $\frac{1}{4}$ -inch-to-the-mile generalized State type maps, and 1-inch-to-the-mile detailed county type maps.

As a result of the reinventories a revised detailed forest type map has been prepared for each of the five counties 1/.

1/ Prints of the forest type maps are available at cost of blueprinting. For information write Director, Pacific Northwest Forest and Range Experiment Station, 423 U. S. Court House, Portland 5, Oregon.

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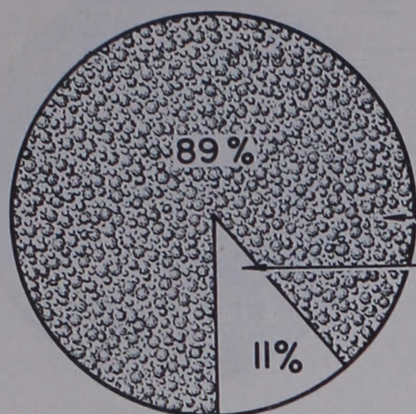
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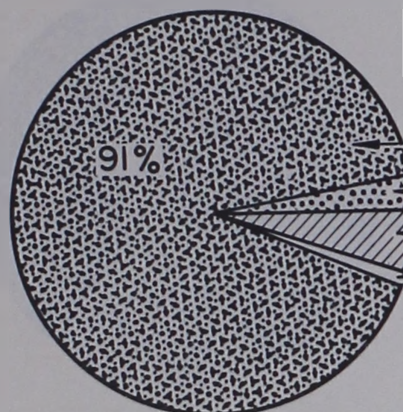
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SIGNIFICANT SURVEY FINDINGS



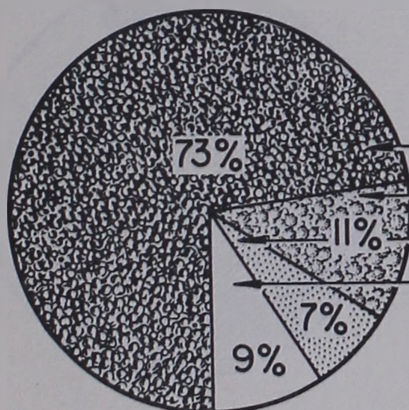
LAND-USE CLASSES

<u>CLASS</u>	<u>THOUSAND ACRES</u>
FOREST LAND	7,234
NONFOREST LAND	911
TOTAL	8,145



FOREST-LAND CLASSES

<u>CLASS</u>	<u>THOUSAND ACRES</u>
COMMERCIAL FOREST	6,581
3% RESERVED COMMERCIAL FOREST	221
5% NONCOMMERCIAL FOREST	364
1% RESERVED NONCOMMERCIAL FOREST	68
TOTAL	7,234

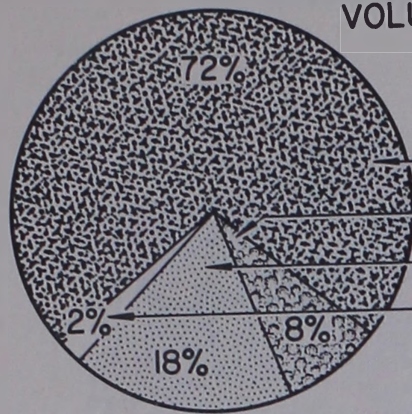


STAND-SIZE CLASSES *

<u>CLASS</u>	<u>THOUSAND ACRES</u>
SAW TIMBER	4,835
POLE TIMBER	713
SEEDLINGS AND SAPLINGS	456
NONSTOCKED	577
TOTAL	6,581

* ON COMMERCIAL FOREST LAND

VOLUME OF LIVE SAW-TIMBER BY SPECIES *



SPECIES GROUP

BILLION BD.FT. SCRIBNER RULE

DOUGLAS-FIR

110

PINES

13

OTHER CONIFERS

27

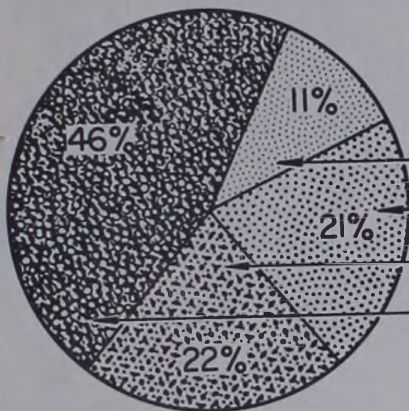
HARDWOODS

3

TOTAL

153

SIZE OF DOUGLAS-FIR TIMBER *



DIAMETER CLASS

BILLION BD.FT. SCRIBNER RULE

11.0" - 20.9" D.B.H.

12

21.0" - 30.9" D.B.H.

23

31.0" - 40.9" D.B.H.

24

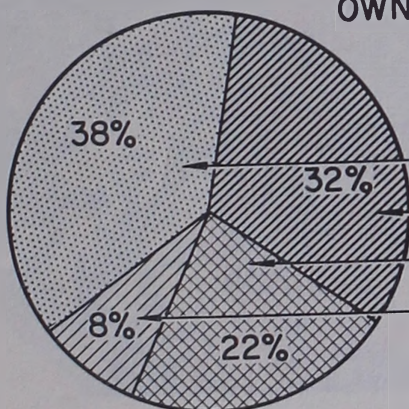
41.0" AND LARGER

51

TOTAL

110

OWNERSHIP OF LIVE SAW-TIMBER VOLUME *



OWNERSHIP

BILLION BD.FT. SCRIBNER RULE

PRIVATE

58

NATIONAL FOREST

49

REVESTED GRANT LANDS

34

OTHER PUBLIC LANDS

12

TOTAL

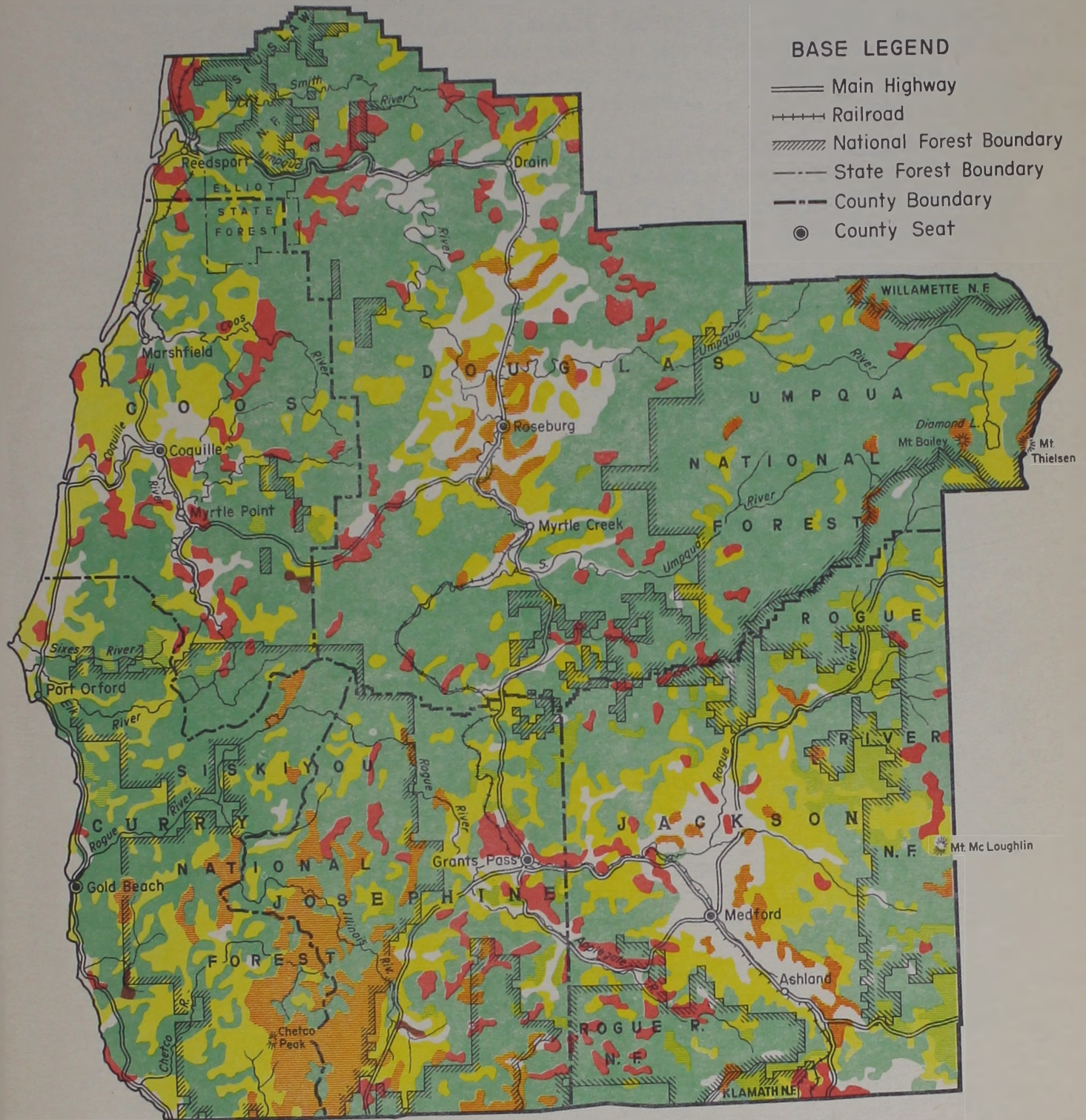
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* ON COMMERCIAL FOREST LAND

FIGURE NO.1

OUTLINE MAP OF SOUTHWEST OREGON UNIT SHOWING GENERALIZED FOREST TYPES 1948

SCALE IN MILES
5 0 5 10 15 20 25



BASE LEGEND

- == Main Highway
- ++++ Railroad
- //// National Forest Boundary
- State Forest Boundary
- - - County Boundary
- County Seat

GENERALIZED FOREST TYPE LEGEND

- | | |
|------------------------------------------|-------------------------------|
| Uncut saw-timber stands | Nonstocked cutovers and burns |
| Partially cut sawtimber stands | Noncommercial forest land |
| Pole-timber, seedling and sapling stands | Nonforest land |

PHYSICAL CHARACTER OF THE UNIT

The Southwest Oregon Unit of the Forest Survey is comprised of five counties--Coos, Curry, Douglas, Jackson, and Josephine--situated in the extreme southwestern portion of the State (fig. 1). Together these five counties constitute a compact forest unit reaching some 100 miles from the Pacific Ocean on the west to the summit of the Cascade Range on the east, and extending approximately 130 miles northward from the boundary between Oregon and California.

Topographic features divide the Unit into two quite distinct physiographic areas: A narrow coastal belt and a broad interior area. The Coast Range enters the Unit from the north and gradually merges with the Siskiyou Mountains in the south. Its crest forms the boundary between the two physiographic areas.

The coastal belt includes nearly all of Coos and Curry Counties and a small portion of Douglas County. In relief the belt consists of very broken terrain extending from either shallow tidal plains or bold headlands along the coast line gradually upward to the crest of the Coast Range or Siskiyou. It is a well-watered area, precipitation being from 60 to 80 inches; it is also a fog belt. In general, the productive capacity of the forest land is higher than the average for the Douglas-fir subregion of western Oregon and western Washington. Much of the land, particularly in Coos County, is of site class II, Douglas-fir classification. Aside from small sand-dune areas along the coast and rocky sterile sites, all of the coastal region was forest land before white settlement. Land clearing for agriculture has reduced the forest area only slightly. Most of the acreage of farm land lies in the Coquille River valley in the central portion of Coos County.

The interior area of the Unit consists of two river basins, roughly comparable in size. The northern portion is the Umpqua River basin and includes all of Douglas County except a small western segment in the coastal region. The southern portion is the Rogue River basin and includes all of Jackson and Josephine Counties and the eastern fringes of Coos and Curry Counties. In each basin there is a fairly broad central valley from which rise gradual slopes or mountain spurs that reach to the basin's flanking ranges. Topography of the Umpqua River basin is in general only moderately rough; that of the Rogue River basin is more rugged, particularly in the western portion comprised of the broken terrain of the Siskiyou Mountains. Annual precipitation in the two basins varies from 20 inches in the valley portion of Jackson County upwards to 70 or 80 inches on the upper slopes of the Cascade Range.

In general, the forest lands of the interior average considerably lower in productive capacity than those of the coastal belt. Of the lands rated by the Douglas-fir site classification those in Douglas and Jackson Counties average class III, those in Josephine County, class IV. Lands in the three counties rated by the ponderosa pine classification are predominantly class III. Forests once covered all of the interior area except the dryer portions of the two central valleys. The clearing of forest land for agricultural use has not greatly increased nonforest land acreage in recent years.

THE FOREST RESOURCE

The Southwest Oregon Unit encompasses the largest remaining concentration of virgin forests in the Pacific Northwest region. Although forest utilization has been large scale in Coos County for nearly three decades, its progress into the other four counties has come largely in the past 10 years; rapid expansion of forest industries here dates from the earlier years of World War II. To date clear- and partial-cutting operations have covered only about one-sixth of the commercial forest land, and saw-timber stands still occupy close to three-fourths of the area. The Unit's saw-timber stands contain 10 percent of the total quantity of saw timber in the Nation and about 1.4 percent of the Nation's total commercial forest land area.

Forest Land

One measure of the forest resource is the extent, expressed in acres, of the forests. In the Unit the Forest Survey reinventory classified a total of 7.2 million acres as forest land, 911,000 as nonforest land (table 1). Thus approximately 89 percent of all land is forest land.

The bulk of the nonforest acreage is located in the two central valleys of the interior (fig. 1). Other small areas lie along some of the larger stream courses and the coast. Approximately three-fourths of the nonforest area is in agricultural use; the remaining one-fourth includes natural grass and brush lands, sand dunes, and town sites.

Table 1.--Land area by major classes of forest land and county,
Southwest Oregon Unit, 1948

Class of land	Total	Coos	Curry	Douglas	Jackson	Josephine
	Thousand acres	Thousand acres	Thousand acres	Thousand acres	Thousand acres	Thousand acres
Forest land						
Commercial	6,581	891	786	2,684	1,457	763
Noncommercial	364	4	59	94	56	151
Reserved						
Commercial	221	2	76	89	6	48
Noncommercial	68		51	9	1/	8
Total	7,234	897	972	2,876	1,519	970
Nonforest land	911	135	72	369	262	73
Total land	8,145	1,032	1,044	3,245	1,781	1,043

1/ Less than 500 acres.

Commercial Forest Land.

A high proportion, 91 percent, of the Unit's forest land is either now producing or is physically capable of producing merchantable timber and is not withdrawn from timber utilization. The Forest Survey classed such land as commercial forest land. 2/ In table 1, forest land so classed is seen to total 6.6 million acres. An additional 221,000 acres is listed as reserved commercial--public land which is withdrawn from timber use. This category includes 207,000 acres of federally owned national forest land currently managed as limited areas for recreational or museum use, 8,000 acres municipally owned and managed as watersheds, 5,000 acres in State parks, and a small acreage each in the Oregon Caves National Monument and in lighthouse reservations along the coast.

The commercial forest land in the Unit was further classified as to the character of the forest cover, known as "stand-size" classification. There are four classes: saw-timber stands; pole-timber stands; seedling and sapling stands; and nonstocked areas. (In this and all succeeding discussion "commercial forest land" refers only to such land in an unreserved status.)

Saw-timber stands. The reinventory found a total of 4.8 million acres of commercial forest land supporting stands of saw timber (table 2). The predominance of this class of timber can best be grasped

2/ Definitions of terms used will be found on page 30.

through study of the generalized type map of figure 1. Of the more than 3,000 million acres still stocked with saw timber of the old-growth age class, 1/4 percent is in Douglas County (table 3).

Table 2.--Commercial forest land area by ownership class
by stand-size class

Southwest Oregon Unit, 1948

Ownership class	Total	Saw-timber stands	Pole-timber stands	Seedling and sapling stands	Non-stocked areas
	Thousand acres	Thousand acres	Thousand acres	Thousand acres	Thousand acres
Federally owned or managed					
National forest	1,991	1,612	189	113	77
Revested grant lands	1,391	1,095	104	78	114
Indian	4	4	1/	1/	
Other	143	90	27	12	14
Total Federal	3,529	2,801	320	203	205
State	101	82	9	8	2
County	234	173	20	22	19
Private	2,717	1,779	364	223	351
Total all ownerships	6,581	4,835	713	456	577

1/ Less than 500 acres.

Douglas-fir predominates on 2.4 million acres, or about 77 percent of the area of old-growth saw-timber stands (table 4). Throughout Coos and Curry Counties and over the vast bulk of Douglas County, the old growth is practically all of Douglas-fir type. In Jackson County this type comprises nearly 60 percent of the old-growth area and in Josephine County it covers almost exactly 50 percent. Stands of old growth in which ponderosa pine is the majority species, cover a total of 168,000 acres; this acreage is chiefly in Jackson County, with small acreages each in Josephine and Douglas Counties. Mixed stands of about equal portions of ponderosa pine and Douglas-fir occupy 99,000 acres of the old-growth area. Sugar pine, an important commercial species of the Unit, is the key species on 220,000 acres of old-growth timber, of which area about three-fifths is in Josephine County; other appreciable acreages of this type are in Jackson, Curry, and Douglas Counties. Mixed stands of true firs and mountain hemlock cover 126,000 acres, chiefly on the upper slopes of the Cascade Range in eastern Douglas and Jackson Counties; there is also some area of the type in the Siskiyou mountains in Josephine County. These stands are usually composed of varying mixtures of Shasta red fir, noble fir, and mountain hemlock; occasionally one of these species may form pure stands over areas of considerable extent.

Table 3.--Commercial forest land area by stand-size class
by county

Southwest Oregon Unit, 1948

Stand-size class	Total	Coos	Curry	Douglas	Jackson	Josephine
	Thousand acres	Thousand acres	Thousand acres	Thousand acres	Thousand acres	Thousand acres
Saw-timber stands						
Old-growth						
Uncut	2,889	190	338	1,350	661	350
Partially cut	195	21	20	10	134	10
Total	3,084	211	358	1,360	795	360
Large young-growth						
Uncut	909	244	118	470	11	66
Partially cut	22	11	1/	3	1/	8
Total	931	255	118	473	11	74
Small young-growth						
Uncut	747	96	113	327	114	97
Partially cut	73	1	1	4	53	14
Total	820	97	114	331	167	111
Total saw-timber stands	4,835	563	590	2,164	973	545
Pole-timber stands	713	90	104	186	253	80
Seedling and sapling stands	456	125	66	114	105	46
Nonstocked areas	577	113	26	220	126	92
Total all stands	6,581	891	786	2,684	1,457	763

1/ Less than 500 acres.

Table 4.--Commercial forest land area by forest type by stand-size class

Southwest Oregon Unit, 1948

Forest type	Total	Saw-timber stands			Pole-timber stands	Seedling and sapling stands	Non-stocked area
		Old growth	Large young growth	Small young growth			
	Thousand acres	Thousand acres	Thousand acres	Thousand acres	Thousand acres	Thousand acres	Thousand acres
Douglas-fir	4,488	2,363	931	598	334	262	
Ponderosa pine ^{1/}	619	267		108	152	92	
Sugar pine	220	220					
Lodgepole pine	86	1			71	14	
Western hemlock	4	2		1		1	
Sitka spruce	31	6		9	1	15	
Cedars	25	16		2	1	6	
True fir-							
mountain hemlock	175	126		34	5	10	
White fir	120	83		28	6	3	
Conifer woodland	65				65		
Hardwoods	171			40	78	53	
Nonstocked areas	577						577
Total	6,581	3,084	931	820	713	456	577

^{1/} Includes 232,000 acres of pine mixture type, composed roughly of equal portions of ponderosa pine and Douglas-fir.

The only other major type of old-growth timber is that in which either white fir or grand fir is the key species. Over the vast bulk of this type's area, 83,000 acres, chiefly in Jackson County, white fir (*Abies concolor*) is the species; on limited areas in Curry, Coos, and Douglas Counties the species is grand fir (*A. grandis*). Of interest because of high commercial value is an area of about 14,000 acres on which Port Orford white-cedar comprises 20 percent or more of the volume; more than three-fourths of this acreage is in Coos County, the remainder in Curry County. This type has been cut heavily in the past, frequently on a partial-cut basis in which the cedar was removed and the associated species, very largely Douglas-fir, were left.

Saw-timber stands classed as large young growth are all of one type, Douglas-fir (table 4). These stands, covering 931,000 acres, are of timber more than 21.0 inches d.b.h. and under about 180 years of age. Slightly more than half of the type's acreage is in Douglas County and a major portion of the remainder is in Coos County (table 3). Partial-cutting operations in Coos, Josephine, and Douglas Counties have covered a total of 22,000 acres of these stands.

Approximately two-fifths of the 820,000 acres of small young-growth saw timber is located in Douglas County, another one-fifth lies in Jackson County, and the remaining two-fifths is quite evenly distributed through the other three counties of the Unit. In these stands, as in the old-growth stands, Douglas-fir forms the type over the major portion of the total area. Pure hardwood stands cover about 5 percent of the area of this class of timber.

Stands less than saw-timber size. Stands classed as pole timber or seedlings and saplings were found on 18 percent of the commercial forest area. Approximately one-third of the 1.2 million acres of this young timber was restocked clear-cut land that had been logged chiefly in the last three decades; two-thirds was restocked burns. Further information on the character of these stands was obtained in a classification of their density of stocking. On the basis of the quadrat method of determining stocking, 26 percent of the young-timber acreage was well stocked, 55 percent was of medium stocking, and 19 percent was poorly stocked.

Nonstocked areas and recent clear-cut areas. The areas classed as nonstocked were of two categories: (1) Areas clear cut before January 1, 1940 that have failed to restock to a density of 10 percent or more; and (2) areas deforested by fire that have not restocked. The old nonstocked cut-over land totaled 46,000 acres, about two-thirds of which is in Coos County; the other one-third is very largely in Douglas County. The nonstocked burns totaled 269,000 acres. Distribution by county was 46 percent in Jackson, 22 percent in Josephine, 20 percent in Douglas, and 6 percent each in Coos and Curry. Practically all of the acreage was in old burns, those on which the original fire occurred from 15 years to several decades in the past. Most of these areas now support a dense cover of brush.

Areas classed as recent clear-cut lands, totaling 262,000 acres, are in a temporary-type status, awaiting a greater lapse of time following cutting before definite classification is made. Their distribution by county--60 percent in Douglas, 26 percent in Coos, 12 percent in Josephine, and 2 percent in Curry and Jackson--indicates the location of clear-cutting operations in the Unit in the last decade. In Jackson County and, to a lesser extent in Josephine County, much of the logging has been on a partial-cut basis.

Noncommercial Forest Land.

Forest lands in the Unit rated in the reinventory as being of such low productive capacity as to be incapable of growing timber of merchantable character were mapped to the extent of 432,000 acres, 6 percent of all forest land. These lands were of three types: (1) Oak-madrone woodland, (2) subalpine forests above the commercial forest zone, and (3) extremely rocky, steep, or sterile sites within the commercial forest zone.

The woodland stands of oak and madrone were found on 115,000 acres in the central valleys of Douglas, Jackson, and Josephine Counties; all but about 5 percent of the acreage was in the first two counties. These stands, chiefly of a scrubby, and usually sparsely stocked, growth of Oregon white oak, sometimes with a minor composition of madrone, cover the dry lower foothills next to the valley floor along the Umpqua and Rogue Rivers.

Subalpine forests cover 46,000 acres, three-fifths of which lie along the eastern boundary of Douglas County and the remainder along the Oregon-California boundary in Josephine and Jackson Counties. The forest cover in this zone is composed of varying mixtures of alpine fir, Shasta red fir, noble fir, mountain hemlock, and lodgepole pine. The timber is short, limby, and is frequently interspersed with small meadows and glades.

Rocky and sterile sites have a total area of 271,000 acres, a large part of which lies in southwestern Josephine County and southeastern and central Curry County in an extensive area of serpentine formation. The usual forest cover on this site consists of a sparse stand of rough, short Jeffrey pine or ponderosa pine.

Timber Volume

A second measure of the forest resource of the Unit is an estimate of the volume, expressed in terms of either board feet or cubic feet, of usable wood contained in the forest stands.

Board-foot volumes.

The board-foot unit was used in determining the estimated net volume of live saw timber. This volume was computed in terms of two log rules: (1) Scribner rule, the board-foot rule commonly used in determining log-scale volume in the Pacific Northwest region; and (2) International $\frac{1}{4}$ -inch rule, the rule adopted as standard by the Forest Service for the presentation of all Forest Survey board-foot volume statistics; this rule approximates lumber tally. Statistics of volume of live saw timber in this report are shown in the tables in terms of both rules. However, in the following discussion of live saw-timber volume, the figures mentioned are in terms of the Scribner rule.

Stands on the commercial forest land of the Unit contain an estimated net volume of 153 billion board feet, Scribner rule (table 5). Nearly 97 percent of this total was found in stands classified as saw timber. The 5 billion board feet in the pole stands and seedling and sapling stands and on areas classed as nonstocked, is in scattered saw-timber trees.

Table 5.--Volume of live saw timber and primary growing stock
on commercial forest land by stand-size class

Southwest Oregon Unit, 1948

Stand-size class	Live saw timber		Primary growing stock
	Million board feet, log scale, Scribner rule	Million board feet, International $\frac{1}{4}$ -inch rule	Million cubic feet
Saw-timber stands			
Uncut	142,492	152,268	26,079
Partially cut	4,888	5,253	952
Total saw-timber stands	147,380	157,521	27,031
Pole-timber stands	3,349	3,684	1,075
Seedling and sapling stands	1,281	1,426	448
Nonstocked areas	552	590	124
<u>Total all stands</u>	<u>152,562</u>	<u>163,221</u>	<u>28,678</u>

Softwoods comprise 98 percent of the live saw-timber volume, hardwoods 2 percent (table 6). Douglas-fir comprises 110 billion board feet, 72 percent of the total volume of all species. The pine volume amounts to 13 billion feet, the vast bulk of which is comprised of the two commercially important species--sugar pine and ponderosa pine. The volume of true firs is in four species--white fir, Shasta red fir, grand fir, and noble fir.

What should be of interest to the forest industries, particularly the makers of plywood, is a break-down of the volume of certain species into diameter-class groups (table 7). Practically all of the 50 billion board feet of Douglas-fir in the large diameter group, 41.0 inches d.b.h. and larger, is of old-growth timber; a small amount is of young growth which, on the lands of high productive capacity, reaches a diameter of 41 inches or more before 180 years, the assumed approximate upper limit of age of young growth. Volume of the second diameter group, 31.0 to 40.9 inches, is comprised chiefly of old-growth timber. In the third diameter group, 21.0 to 30.9 inches, the bulk of the volume is young growth. The volume of the small diameter group, 11.0 to 20.9 inches, is practically all young growth. Roughly 80 percent of the volume of ponderosa pine and 90 percent of the sugar pine can be classed as old-growth timber.

Table 6.--Volume of live saw timber and primary growing stock
on commercial forest land by species

Southwest Oregon Unit, 1948

Species	Live saw timber		Primary growing stock
	Million board feet log scale, Scribner rule	Million board feet International $\frac{1}{4}$ -inch rule	Million cubic feet
Softwoods:			
Douglas-fir	109,560	116,836	20,022
Ponderosa pine <u>1/</u>	5,446	5,809	813
Sugar pine	6,968	7,348	965
Western white pine	457	494	92
Lodgepole pine	155	181	121
True firs <u>2/</u>	14,060	15,186	2,716
Western hemlock	4,119	4,449	981
Western redcedar	2,754	2,919	471
California incense-cedar	2,802	3,083	649
Port Orford white-cedar	1,688	1,789	264
Sitka spruce	274	290	53
Redwood	84	87	13
Mountain hemlock	1,052	1,135	249
Engelmann and weeping spruces	15	17	3
Total softwoods	149,434	159,623	27,412
Hardwoods:			
Red alder	997	1,146	321
Bigleaf maple	379	437	141
Tanoak	870	1,001	374
Pacific madrone	425	489	208
California black oak	274	315	105
Other hardwoods <u>3/</u>	183	210	117
Total hardwoods	3,128	3,598	1,266
Total all species	152,562	163,221	28,678

1/ Includes small volume of Jeffrey pine.

2/ Includes white fir, Shasta red fir, grand fir, and noble fir.

3/ Includes Oregon white oak, canyon live oak, California laurel (myrtle), and golden chinquapin.

Table 7.--Volume of live Douglas-fir, ponderosa pine, and
sugar pine saw timber on commercial forest land
by diameter-class group

Southwest Oregon Unit, 1948

Diameter class	Total	Douglas- fir	Ponderosa pine 1/	Sugar pine
11.0" to 20.9" d.b.h. Million bd.ft. log scale, Scribner rule	13,235	12,564	396	275
Million bd.ft. Inter- national $\frac{1}{4}$ -inch rule	15,352	14,574	459	319
21.0" to 30.9" d.b.h. Million bd.ft. log scale, Scribner rule	24,895	22,820	1,397	678
Million bd.ft. Inter- national $\frac{1}{4}$ -inch rule	26,886	24,645	1,509	732
31.0" to 40.9" d.b.h. Million bd.ft. log scale, Scribner rule	27,893	23,669	2,159	2,065
Million bd.ft. Inter- national $\frac{1}{4}$ -inch rule	29,567	25,090	2,288	2,189
41.0" d.b.h. and larger Million bd.ft. log scale, Scribner rule	55,951	50,507	1,494	3,950
Million bd.ft. Inter- national $\frac{1}{4}$ -inch rule	58,188	52,527	1,553	4,108
All diameter classes Million bd.ft. log scale, Scribner rule	121,974	109,560	5,446	6,968
Million bd.ft. Inter- national $\frac{1}{4}$ -inch rule	129,993	116,836	5,809	7,348

1/ Includes small volume of Jeffrey pine.

All-Timber Volume.

The cubic-foot unit of measure was used in determining the net volume of all timber, in both living and dead trees. The all-timber volume was divided into three categories: Primary growing stock, or all live saw-timber and pole-timber trees 5.0 inches d.b.h. and larger; secondary growing stock, or all live cull trees in saw-timber and pole-timber sizes; and dead but salvable saw-timber trees.

Primary growing stock. The net volume of the primary growing stock totaled nearly 29 billion cubic feet (table 5). Of this volume 94 percent was found in saw-timber stands; the major portion of the remainder was in pole-timber stands. Douglas-fir made up 70 percent of this volume compared to 72 percent of the board-foot volume of live saw timber (table 6).

Secondary growing stock. The estimated sound merchantable volume contained in live cull trees was calculated to be 2 billion cubic feet (table 8). Practically all of this volume was in trees of saw-timber size; the volume in pole-timber trees amounted to only three-tenths of a percent of the total. Nearly 97 percent of the sound cull volume was of softwood species, very largely Douglas-fir.

Salvable dead. The volume of sound merchantable material contained in dead standing and down trees was estimated to total 224 million cubic feet (table 8). This volume was very largely of Douglas-fir and the cedars.

Reserved Timber Volume.

The volume of live saw timber on commercial forest land in a reserved ownership status amounted to 4,058 million board feet (table 11, page 16). The volume of reserved primary growing stock was 966 million cubic feet.

Table 8.--All-timber volume on commercial forest land
by kind of material

Southwest Oregon Unit, 1948

Kind of material	Volume
	<u>Million cubic feet</u>
Live all timber	
Primary growing stock	28,678
Secondary growing stock	2,018
Total	30,696
Salvable dead all timber	224
Total all timber	30,920

Forest Ownership

In general, forest ownership in the Southwest Oregon Unit is characterized by two patterns. A patchwork of alternating private and public lands occurs on roughly two-thirds of the area; extensive, almost solid, bodies of federally owned national-forest land are on the remaining one-third. There are five broad classes of ownership of the Unit's commercial forests: Private, State, County, Indian, and Federal.

Private Ownership.

Forest-industry companies, nonoperating companies, and individuals own a total of 2.7 million acres, or 41 percent of the commercial forest land (table 2). Private holdings in this Unit average smaller than in most of the other units of the Douglas-fir subregion. Prior to the greatly expanded operations of forest industries in the Unit, dating from about the beginning of the past decade, there were a large number of holdings of small to medium size and few large compact tracts in one ownership. With the recent expansion of lumbering and plywood activities here, however, there have been many sales and exchanges, resulting in the blocking-up of holdings.

The zone of private forest ownership roughly includes the western two-thirds of Douglas County, all but the northeastern portion of Jackson County, nearly all of Josephine County, all but the southern tip of Coos County, and the western one-fourth of Curry County. This zone, except for the portion in Curry County, coincides approximately with the zone of federally owned revested grant lands which originally included every odd-numbered section. Although a considerable acreage of these grant lands has gone into private ownership through homesteading, sales, and exchanges, the checker-board pattern of private and Federal ownership still prevails to a large extent.

Thirty-seven percent of the area of saw-timber stands is on private holdings (table 9). A considerably smaller portion of the old-growth saw timber is so held; the concentration of past logging operations in the Unit, largely on private lands, has been responsible for this. On the other hand, the proportion of the young-growth saw timber, both large and small, privately owned, is high.

The portion of total volume of live saw timber on private holdings is 38 percent (table 10), a one-percent higher portion than that of saw-timber acreage.

Table 9.--Saw-timber stands on commercial forest land by ownership class by age class of stands

Southwest Oregon Unit, 1948

Ownership class	All saw-timber stands Percent	Age class of saw-timber stands		
		Old growth Percent	Large young growth Percent	Small young growth Percent
National forest	33	38	25	26
Revested grant lands	23	25	21	15
Other public	7	5	11	10
Private	37	32	43	49
Total	100	100	100	100

Table 10.--Volume of live saw timber and primary growing stock on commercial forest land by ownership class

Southwest Oregon Unit, 1948

Ownership class	Live saw timber		Primary growing stock
	Million bd.ft. log scale, Scribner rule	Million bd.ft. International $\frac{1}{4}$ -inch rule	Million cubic feet
Federally owned or managed			
National forest	48,777	52,186	9,295
Indian	115	123	23
Revested grant lands	33,667	36,019	6,262
Other	2,706	2,894	510
Total Federal	85,265	91,222	16,090
State	3,862	4,131	665
County	5,142	5,501	972
Private	58,293	62,367	10,951
Total all ownerships	152,562	163,221	28,678

Federal Ownership.

The lands federally owned in the Unit are of three categories, depending upon their original ownership history and the Federal agency under which they are currently administered. A fourth class is federally managed but not owned.

National-forest lands comprise 30 percent of the area of commercial forest land and total almost 2 million acres. These lands are included in six national forests--Klamath, Rogue River, Siskiyou, Siu-slaw, Umpqua, and Willamette (fig. 1)--under the administration of the Forest Service, U. S. Department of Agriculture. National-forest ownership includes 33 percent of the total acreage of saw-timber stands, and a somewhat greater portion--38 percent--of the old-growth saw timber. Thirty-two percent of the live saw-timber volume is on the national-forest lands (table 10).

Revested grant lands include portions of two early government grants made to promote the development of transportation in western Oregon. One of the grants was to the Oregon and California Railroad--later a part of the Southern Pacific Company--and consisted of the odd-numbered sections within a 20-mile-wide strip on each side of the right-of-way, plus an indemnity strip 10 miles wide on each side. The other grant, similar and made to the Coos Bay Wagon Road Company, was somewhat less extensive. In both grants the lands were to be sold to settlers. Later, however, the Government charged terms of the grants had been violated and in 1916 the unsold lands were revested in Federal ownership.

The grant lands contain a total of almost 1.4 million acres of commercial forest land, 21 percent of the Unit's total. Included on them are 23 percent of the saw-timber acreage and 22 percent of the live saw-timber volume.

Public Domain lands include the scattered remnants of the unappropriated Federal lands lying outside the national-forest boundaries. The commercial forest land area of these lands totals 143,000 acres. Of this area, 90,000 acres support saw-timber stands having a merchantable volume of 2.7 billion board feet, less than 2 percent of the Unit's total. These lands are administered by the Bureau of Land Management, U. S. Department of Interior.

Indian lands include tribal lands and trust allotments held in fee by the Federal Government but administered and managed for Indian tribal groups, or allotted in trust to individual Indians. These lands, scattered in small parcels in various parts of the Unit, total 4,000 acres of commercial forest land (table 2), about 90 percent of which supports saw timber. Merchantable volume of saw timber is 115 million board feet. The Office of Indian Affairs, U. S. Department of Interior, manages these lands for the Indians.

Other Public.

Included in this general class is 101,000 acres of commercial forest land owned by the State of Oregon, and 234,000 acres owned by the five county governments. The volume of the State-owned saw timber amounts to nearly 4 billion board feet and that owned by the counties totals a little more than 5 billion board feet.

Reserved Ownerships.

Of the timber volume on reserved commercial forest land, totaling 4 billion board feet (table 11), approximately 95 percent is in national-forest ownership on lands managed as recreational or museum areas. The remaining 5 percent is on lands in municipal watersheds, on the Oregon Caves National Monument, and on a number of small State parks.

Table 11.--Volume of live saw timber and primary growing stock on reserved commercial forest land by ownership class

Southwest Oregon Unit, 1948

Ownership class	Live saw timber		Primary growing stock
	Million bd.ft. log scale, Scribner rule	Million bd.ft. International $\frac{1}{4}$ -inch rule	Million cubic feet
Federally owned			
National forest	3,841	4,148	921
Other <u>1/</u>	10	11	2
Total Federal	3,851	4,159	923
State	95	103	20
Municipal	112	121	23
Total all ownerships	4,058	4,383	966

1/ Oregon Caves National Monument.

GROWTH AND MORTALITY

Growth

The rate of current annual net growth on the commercial forest land of the Unit was computed in terms of two standards: (1) live saw-timber growth and (2) primary-growing-stock growth.

Live saw-timber growth in trees 11.0 inches d.b.h. and larger was calculated to be 1,241 million board feet, log scale, Scribner rule (table 12). Expressed in terms of the International $\frac{1}{4}$ -inch rule the volume was 1,329 million board feet. Approximately 96.5 percent of the growth was of softwood species, 3.5 percent of hardwood species.

Primary-growing-stock growth in trees 5.0 inches d.b.h. and larger, including both live saw-timber trees and pole-timber trees, was calculated to be 183 million cubic feet (table 12).

Mortality

The annual total net volume removed currently from the live saw timber and from the primary growing stock through death of trees from natural causes was calculated. This volume was of a magnitude that can be considered as normal timber mortality; it included no losses of a catastrophic nature.

Live saw-timber normal mortality in trees 11.0 inches d.b.h. and larger totaled 607 million board feet, log scale, Scribner rule (table 12). In terms of the International $\frac{1}{4}$ -inch rule it was 660 million board feet. Softwoods comprised 98.4 percent of the mortality, hardwoods 1.6 percent.

Primary growing stock normal mortality in trees 5 inches d.b.h. and larger, including both live saw-timber trees and pole-timber trees, totaled 90 million cubic feet.

Table 12.--Net growth and normal mortality of live saw timber and primary growing stock
on commercial forest land by species group, Southwest Oregon, 1948

Species group	Live saw-timber volume				Primary growing stock	
	Current annual net growth	Current annual normal mortality	Current annual net growth	Current annual normal mortality	Current annual net growth	Current annual normal mortality
	<u>Million bd.ft.</u> <u>log scale</u> <u>Scribner rule</u>	<u>Million bd.ft.</u> <u>log scale</u> <u>Scribner rule</u>	<u>Million bd.ft.</u> <u>International</u> <u>$\frac{1}{4}$-inch rule</u>	<u>Million bd.ft.</u> <u>International</u> <u>$\frac{1}{4}$-inch rule</u>	<u>Million</u> <u>cubic feet</u>	<u>Million</u> <u>cubic feet</u>
Softwoods	1,197	597	1,278	649	163	87
Hardwoods	44	10	51	11	20	3
Total	1,241	607	1,329	660	183	90

COMMODITY DRAIN

The trend of forest utilization in the Unit is clearly traced in a statistical record of annual log production from 1925 to 1948 (table 13). As logs have comprised all but about 0.5 percent of the total volume of timber cut, statistics of their production therefore tell the story of utilization here.

Except in Coos County, lumbering and other forest industries were small scale in the Unit during the early years of the period 1925-48. Sawmilling operations had expanded rapidly in Coos County during and immediately after World War I, and by 1925 there were 17 active mills, several of large capacity, in the county with a total lumber production of approximately 380 million board feet. The combined production in the other four counties of the Unit at this time was about 122 million board feet. Harbor facilities sufficient for both transoceanic and coast-wise shipping were responsible for the earlier development in Coos County. The only other deep-water harbor in the Unit is at Reedsport in the western portion of Douglas County where facilities were improved about 1938 to 1940. Shipping throughout the remainder of the Unit has been by rail and truck.

The years shortly preceding World War II, 1937-40, mark the beginning of greatly increased expansion of forest-products industries in the Unit, and particularly in Douglas and Jackson Counties. Falling off only in 1945, log production increased steadily to a total of 2.6 billion board feet in 1948. This volume represents a fourth of total production in the Douglas-fir subregion.

What the large production of logs in recent years has meant in terms of drain on the forest resource of the Unit was determined in a survey of commodity drain in 1948. Commodity drain included the volume of timber removed in the form of logs, poles, fuelwood, and other products--termed cutting drain--plus the volume of unused merchantable material felled but left in the woods following logging operations--termed logging waste. Results of this survey were expressed as total board-foot drain on the live saw-timber volume and also as total cubic-foot drain on the primary growing stock (table 14). The item of 2,610,229,000 board feet, Scribner rule, of cutting drain includes 2,569,334,000 board feet cut in form of logs, and 40,895,000 cut in form of piling, poles, fuelwood, and fence posts. No volume of products cut from dead timber is included in these cutting drain figures.

Table 13.--Annual log production^{1/} by county by year, 1925 to 1948
Southwest Oregon Unit

Thousand board feet, log scale, Scribner rule

Year	Unit total	Coos	Curry	Douglas	Jackson	Josephine
1925	454,485	326,650	3,980	58,030	61,615	4,210
1926	469,650	308,215	4,765	81,330	67,395	7,945
1927	465,180	291,640	4,000	105,805	56,165	7,570
1928	468,320	298,580	4,750	72,525	81,785	10,680
1929	585,175	338,225	4,685	129,580	93,840	18,845
1930	293,062	138,330	1,095	66,392	74,135	13,110
1931	177,476	97,137	195	25,391	43,948	10,805
1932	105,992	56,285	1,395	24,617	19,920	3,775
1933	205,972	105,931	1,399	44,221	38,782	15,639
1934	517,890	369,190	10,381	84,826	32,851	20,142
1935	421,601	214,120	17,181	118,581	47,537	24,182
1936	545,445	248,128	38,033	146,918	79,847	32,519
1937	877,005	565,956	33,583	127,296	115,134	35,036
1938	561,794	275,965	37,639	140,768	86,372	21,050
1939	727,534	332,084	74,686	178,921	127,067	14,776
1940	847,469	398,408	49,103	246,148	128,847	24,963
1941	1,343,702	561,767	66,705	349,294	310,355	55,581
1942	1,300,678	450,835	50,115	410,625	282,034	107,069
1943	1,460,798	423,132	54,045	511,351	341,199	131,071
^{2/}						
1945	1,256,009	289,950	25,800	517,999	290,565	131,695
1946	1,666,388	422,722	22,320	718,052	339,597	163,697
1947	2,074,733	560,623	50,332	857,214	409,179	197,385
1948	2,628,330	530,356	121,247	1,134,439	590,596	251,692

^{1/} Includes production from both live and dead timber; the volume of the latter is relatively very small.

^{2/} Production statistics for 1944 not available.

Table 14.--Commodity drain of live saw-timber volume and primary growing stock on commercial forest land, by species group
Southwest Oregon Unit, 1948

Species group	Live saw-timber volume						Primary growing stock		
	Cutting drain	Logging waste	Commodity drain ^{1/}	Cutting drain	Logging waste	Commodity drain ^{1/}	Cutting drain	Logging waste	Commodity drain ^{1/}
	Thousand board feet, log scale, Scribner rule			Thousand board feet, International $\frac{1}{4}$ -inch rule			Thousand cubic feet		
Softwoods	2,606,781	367,231	2,974,012	2,997,798	422,316	3,420,114	503,286	60,483	563,769
Hardwoods	3,448	184	3,632	3,965	212	4,177	845	30	875
Total	2,610,229	367,415	2,977,644	3,001,763	422,528	3,424,291	504,131	60,513	564,644

^{1/} Total of cutting drain and logging waste.

COMPARISON OF INVENTORIES

A comparison of certain statistics on total land area, forest-land areas by stand-size class, and timber volumes obtained in the two inventories--the initial in 1933 and the reinventory in 1948--provides information on changes in the over-all forest situation in the Unit.

Land Area

Ordinarily there would be no difference in the total land area in the Unit as of the two dates. However, during the 15-year interval the General Land Office made some original land surveys of unsurveyed areas, and resurveys of several townships. These surveys increased by 14,000 acres the total land area in the Unit as computed in 1933.

Forest Land

Total Forest Land.

In 1933 a total of 7,178,000 acres was classified as forest land in contrast with 7,235,000 acres in 1948, a difference of 57,000 acres or 0.8 percent. After deducting the increase in total land area mentioned above the difference is 43,000 acres, practically all of which is accounted for in the more intensive classification and mapping of forest versus nonforest land, possible in the reinventory through use of aerial photos. Nearly all of the difference was in the valley portions of Jackson and Douglas Counties in mapping patchwork areas of forest and agricultural land.

Commercial Forest Land.

The combined area of commercial forest land and reserved commercial forest land was 6,802,000 acres in 1948 in contrast with 6,691,000 acres in 1933. Most of this difference is traced to certain low site quality serpentine areas in Josephine and Curry Counties, classified as commercial forest land in 1948, but not in 1933. Another reason for the difference was in the mapping of the sparse pine woodland in Jackson County and in the classification of some of the hardwood stands there and in Douglas County.

Saw-Timber Stands.

A direct comparison of total acreage of all saw-timber stands as of 1933 and 1948 is impractical because of a difference in some specifications and standards of utilization between inventories. In the initial inventory the minimum breast height diameter of conifer saw

timber was 15.0 inches. Also, small young-growth saw-timber stands from 15.0 to 20.9 inches d.b.h. were combined with pole-timber stands 5.0 to 14.9 inches. In the reinventory the minimum diameter of all conifer saw timber was 11.0 inches and type acreages of small young-growth saw timber were mapped and measured separately from pole-timber type acreages.

However, a comparison can be made of the acreages of saw timber 21.0 inches d.b.h. and larger, which includes the old-growth and large young-growth saw timber. In 1933 the uncut stands of these two classes of timber on commercial forest land totaled 4,354,000 acres; in 1948 they totaled 3,796,000 acres, a reduction of 558,000 acres or about 13 percent. Further analysis of the statistics shows:

<u>Type of change between inventories</u>	<u>Acres</u>
Clear cut - - - - -	200,000
Partially cut (residual stand still qualifies as saw timber) - - - - -	217,000
Transferred to reserved-ownership status - - - - -	<u>141,000</u>
Total - - - - -	558,000

The 141,000 acres, transferred to a reserved-ownership status, was chiefly of low-quality stands on the higher slopes and ridges.

A comparison of acreages of each of the saw-timber types shows a reduction, at times large, of some types due to cutting and an increase in other types, due to ingrowth from small young-growth stands. Because of their great predominance in the Unit and their commercial importance, the Douglas-fir types have been subjected to the greatest changes. The acreage of old-growth Douglas-fir was reduced 512,000 acres. In contrast, the acreage of Douglas-fir large young-growth saw timber was increased by 152,000 acres. Approximately three-fourths of this acreage increase was in Coos County where there was, in 1933, a considerable area of 50- to 70-year stands just under the minimum diameter limit (21.0 inches d.b.h.) of large young-growth saw timber; during the 15-year interval these grew into this size class. There was also an increase in acreage in Curry and Josephine Counties; in Douglas and Jackson Counties there was a decrease, the result of stands growing into the old-growth saw-timber class and some utilization.

Small Young-Growth Saw Timber and Pole Timber Stands.

In 1948 the acreage of young-growth stands 5.0 to 20.9 inches d.b.h.--small young-growth saw timber and pole timber--amounted to

1,534,000 acres in contrast to 1,285,000 acres in 1933. Thus in the interval, ingrowth of this class of timber exceeded outgrowth by 249,000 acres; cutting in these stands was insignificant. Douglas-fir stands of this size class showed a small decrease in area.

There was a large increase in hardwood types of these classes of timber, practically all in Coos and Curry Counties.

Seedling and Sapling Stands.

The area of seedling and sapling stands increased from 317,000 acres to 457,000 acres in the interval. More than half of this increase was of the Douglas-fir type, chiefly in Coos County where clear-cut lands had restocked. Pine types increased materially in Jackson and Josephine Counties. Another significant increase was in the area of young hardwood type, which restocked burns, particularly in Curry County and to a lesser extent in Coos County.

Nonstocked Areas and Recent Clear-Cut Areas.

Comparison of the respective areas of burns and old cut-over land in a nonstocked condition can be made, but comparison of the respective recent clear-cut acreages is meaningless since this type is in a temporary status awaiting a lapse of time before classification is made.

The total area of nonstocked burns in 1933 was 469,000 acres; in 1948 it was 270,000 acres, indicating a very material amount of restocking. The decrease in nonstocked burns is all the more impressive in view of the extensive areas deforested in the first half of the period between inventories. Fires in 1936, 1938, and 1939 were particularly bad in the Unit, and a considerable acreage was burned over. Much of this has restocked.

The area of old cut-over land that was in a nonstocked condition increased from 17,000 acres to 46,000 acres.

Timber Volume

As in the case of saw-timber acreages of the two inventories, differences in specifications and standards make a direct comparison of saw-timber volumes impractical. However, there were no differences in specifications and standards of utilization involved in the two inventories of primary growing stock, which includes the net volume of all live saw-timber trees and pole-timber trees, 5.0 inches d.b.h. and larger, and a comparison is possible.

Primary Growing Stock.

In 1933 the volume of primary growing stock on commercial and reserved commercial forest land totaled 31,794 million cubic feet; in 1948 it was 29,644 million, a decrease of approximately 7 percent.

Live Saw Timber.

The net volume of live saw timber in trees 15.0 inches d.b.h. and larger on commercial and reserved commercial forest land in 1933 totaled 128 billion board feet, log scale, Scribner rule; in 1948 the volume in trees 11.0 inches d.b.h. and larger totaled 156 billion board feet, an increase of about 22 percent. This increase reflects the gradual intensification of utilization during the 15-year period and accounted for in the 1948 inventory through the lowering of the minimum diameter of saw timber and the use of revised volume tables based on more intense utilization standards.

The major share of the increase in saw-timber volume resulted from differences in the volume tables employed in the two inventories. Another important factor was the additional volume in trees from 11.0 to 15.0 inches, particularly as the Unit contains a large acreage of thrifty young-growth stands that have recently reached the 11.0-inch minimum. A third factor was the inclusion in the 1948 inventory of volume in scattered old-growth trees in pole, seedling and sapling types, and on areas classed as nonstocked, regardless of volume per acre or accessibility; this volume totaled more than 5 billion board feet. The 1933 inventory included very little of this volume because the board-foot volume in young-growth saw-timber trees in pole stands was computed from yield tables which made no provision for scattered overstory trees. Old-growth volume was estimated for pole, seedling and sapling types only when the field man judged the scattered overstory timber to be of sufficient volume and accessibility to constitute a profitable logging show under economic conditions prevailing during the early 1930's.

Forest Growth

A direct comparison of the current annual net growth rates calculated from data obtained in the two inventories is not possible because of some differences in specifications.

Primary Growing Stock.

The net annual cubic-foot growth on pole-timber trees and saw-timber trees 3.6 inches d.b.h. and larger but under 160 years of age was calculated in 1933 to be 166 million cubic feet. In 1948 the cubic-foot growth on all pole-timber trees and saw-timber trees 5.0 inches d.b.h. and larger regardless of age, was calculated to be 183 million cubic feet.

Live Saw Timber.

In 1933 the net annual board-foot growth on saw-timber trees 11.0 inches d.b.h. and larger but under 160 years of age was 900 million board feet, log scale, Scribner rule; net growth in older trees was assumed to be offset by mortality and decay. In 1948 the growth on all saw-timber trees 11.0 inches d.b.h. and larger regardless of age, was 1,241 million board feet.

FOREST SURVEY PROCEDURE

The procedure used in the Forest Survey reinventory of the five counties of the Southwest Oregon Unit differs materially from that used in their initial inventory. Some of the differences between statistics obtained in the two surveys are directly traceable to the change in procedure. Therefore, a description of each procedure seems in order.

Initial Inventory

The initial inventory of the Southwest Oregon Unit, started in 1932 and completed in 1933, was conducted by what was known as the "compilation method." In this method all existing forest type, timber volume, and other pertinent data were collected from a large number of public and private sources. These data were checked in the field for reliability and then adjusted to specifications set by Forest Survey. Information on areas not covered by existing data was obtained through field reconnaissance.

All land in each county was classified by ground reconnaissance as either forest or nonforest. The forest land was then classified as commercial or noncommercial. Each of these broad categories was further subdivided into forest types, the commercial forest land still further into stand-size classes and, in case of young growth, into stocking classes. All such types and classes were delineated on base maps of each township on a scale of one inch equals one mile. These township type maps were then superimposed over ownership-status plats and a dot count made to obtain statistics on area of each forest type by ownership class. Type delineations of the township maps were traced to a base map of the county in the drafting of a county forest type map. The commercial forest land was also classified by site quality, or forest-productive capacity.

In-place, timber-volume estimates were based on existing cruises collected from private timber owners and public agencies, on field samples, and on ocular estimates. The reliability of the existing cruises collected was determined by field check cruises and, on basis of these checks, they were also adjusted to a common standard of

utilization set by Forest Survey. The volume of young-growth saw timber was computed by applying yield-table values, adjusted for age of stand, stocking density, and site, to type averages.

Reinventory

In the reinventory of the five counties of the Unit complete revision of the 1-inch forest type map of each county was obtained through interpretation, classification, and mapping on aerial photos covering all of the land area. Types whose classifications were in doubt and species composition of stands were checked by field reconnaissance. Forest types, stand-size classes, and stocking classes of young growth were similar to those recognized in the initial inventory. However, the use of aerial photos in mapping resulted in type delineations of much greater accuracy and detail than were possible through the ground reconnaissance employed in the initial inventory. The type delineations on the aerial photos were transferred to a 1-inch county base map through use of a photo projector. The new type map was then superimposed over the current ownership-status map of complete county coverage and a dot count made of forest type areas by ownership class.

Estimates of volumes each of live saw timber, primary growing stock, secondary growing stock, and salvable dead material were calculated by applying average per-acre volumes to the appropriate forest type acreages. These average per-acre volumes were obtained by a sampling procedure in which randomly selected plots were measured in each of three sampling strata: uncut saw timber, partially cut saw timber, and immature stands. Intensity of the sampling was so designed as to produce a total estimate of volume in the Unit of a specified sampling accuracy set by Forest Survey. In the random selection of samples each individual stand in the Unit had an equal chance of being selected. A sample consisted of a cluster of either 3 or 5 one-fifth-acre circular plots spaced at regular intervals $\frac{3}{4}$ on a selected cardinal bearing.

A total of 277 plot clusters, or 1,049 one-fifth-acre plots, was taken. The number of plot clusters in each of the three sampling strata was as follows:

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- $\frac{3}{4}$ Three plots at 6-chain intervals were taken in Coos, Curry, and Josephine Counties and all of Douglas County except eastern one-third; 5 plots at 2-chain intervals were taken in Jackson and eastern Douglas Counties.

<u>Sampling stratum</u>	<u>Number of sample plot clusters</u>
Uncut saw timber	171
Partially cut saw timber	42
Immature stands	64
Total	<u>277</u>

Average per-acre volumes on the nonstocked areas and recent clear-cut areas in the Unit were based on a photo-plot sampling procedure. A total of 389 one-acre photo plots was taken in a modified systematic-random fashion on nonstocked types. By photo interpretation, estimates were made of average number of trees per acre of both saw-timber and pole-timber size, average crown diameter, and total tree height; volume of the average tree was obtained from photo-volume tables.

Forest Growth and Mortality

Forest Growth Procedure in Initial Inventory.

In 1933 the current annual net growth was calculated by applying yield-table values, adjusted for stand age, stand density, and site quality, to the acreages of young-growth stands under 160 years of age. Net growth in older stands was assumed to be offset by mortality and decay.

Forest Growth Procedure in Reinventory.

In 1948 the cubic-foot and board-foot growth rates for uncut saw-timber stands were obtained by plotting net stand volumes, collected on the randomly selected inventory sample plots, over their corresponding stand ages and determining a least-squares regression. The regression coefficient was used as the average annual net growth per acre.

In the case of partially cut saw-timber stands and immature stands the cubic-foot and board-foot growth rates were derived from a method involving the use of increment cores taken on the randomly selected inventory sample plots in these two classes of stands.

ACCURACY OF DATA

Forest Area

Under the reinventory procedures employed in the mapping and classification of the forests of the Southwest Oregon Unit, errors were possible in technique, in the judgment of field men, in faulty computations of basic data, and in the projection of forest type detail from the aerial photos to inaccurate base maps. Every effort was made to eliminate errors in judgment and technique through training, supervision, and standardization of all phases of the work. In the computation of data frequent checks were made. Standardization of type classification and mapping was greatly facilitated by availability of complete aerial photo coverage. There was no sampling error because classification and in-place mapping were on the basis of 100-percent coverage.

Timber Volume

The random sampling procedure used in the determination of timber volume in the Unit produced estimates that were subject to two types of error: (1) errors in technique, tree measurement, plot-area measurements, judgment of merchantable height and of defect and breakage allowance, volume tables used, and in computation of data; and (2) sampling error. The extent of errors of the type listed under "(1)" is either impossible or difficult to calculate; in all phases of the work, however, training, supervision, and checking were employed to minimize the effect of such errors.

The sampling error, in terms of one standard error, was computed for both the total board-foot volume estimate of live saw timber, and for the total cubic-foot volume estimate of primary growing stock. Analysis of the variation in the sample data indicates that the sampling error in case of the board-foot volume of live saw timber on commercial forest land was ± 5.08 percent. The probabilities are two out of three, therefore, that the actual volume if measured by a 100-percent tree cruise would have been within ± 5.08 percent of the estimated volume. Expressed in terms of board feet, the sampling error is $\pm 7,750$ million board feet (5.08 percent of the total volume of 152,562 million board feet, log scale, Scribner rule). In the case of estimated volume of primary growing stock, the sampling error was calculated to be $\pm 1,296$ million cubic feet or ± 4.52 percent.

The greater the detail of the volume estimates, the greater the sampling error. Thus the estimates by species, by stand-size class, or by ownership class, are not as accurate as the Unit's total volume estimate.

DEFINITION OF TERMS USED

Land Area

Total Land.

Includes dry land and unmeandered water surface.

Forest Land.

Includes (a) land which is at least 10 percent stocked by trees of any size and capable of producing timber or other wood products, or of exerting an influence on the climate or on the water regime; and (b) land from which the trees described in "(a)" have been removed to less than 10 percent stocking and which has not been developed for other use. Minimum area of forest land recognized in reinventory of the Unit was 40 acres.

Nonforest Land.

Land that does not qualify as forest land. Minimum area recognized in the reinventory of the Unit was 40 acres.

Forest Land Classes

Commercial Forest Land.

Forest land which is producing, or is physically capable of producing, usable crops of wood, economically available now or prospectively, and not withdrawn from timber utilization.

Reserved-Commercial Forest Land.

Commercial forest land managed for purposes other than timber production; the timber is not available for cutting because of statute, proclamation, or policy.

Noncommercial Forest Land.

Forest land which is incapable of yielding usable wood products because of adverse site conditions, or so physically inaccessible as to be permanently unavailable economically, and not withdrawn for specified purpose.

Reserved Noncommercial Forest Land.

Noncommercial forest land included in areas set aside by statute, proclamation, or policy, as recreational or museum areas.

Forest Types

Forest Type.

A forest stand characterized by the predominance of certain key species--in terms of cubic volume for saw-timber and pole-timber stands, and in number of trees for seedling and sapling stands--or a forest condition such as nonstocked cut-over or burned-over land. The generalized forest types listed in table 4 are of the following composition:

Douglas-fir. Stands comprised of 60 percent or more of Douglas-fir by cubic volume or number of trees.

Ponderosa pine. Stands comprised of 20 percent or more of ponderosa pine by cubic volume or number of trees.

Sugar pine. Stands comprised of 20 percent or more of sugar pine, and less than 50 percent of ponderosa pine, by cubic volume or number of trees.

Lodgepole pine. Stands comprised of 50 percent or more of lodgepole pine by cubic volume or number of trees.

Western hemlock. Stands comprised of 50 percent or more of western hemlock by cubic volume or number of trees.

Sitka spruce. Stands comprised of 50 percent or more of Sitka spruce by cubic volume or number of trees.

Cedar. Stands comprised of 40 percent or more of western redcedar, or 20 percent or more of Port Orford white-cedar, by cubic volume or number of trees.

True firs-mountain hemlock. Stands in which either Shasta red fir, noble fir, Pacific silver fir, or mountain hemlock or any combination of these species, comprise 50 percent or more of the cubic volume or number of trees.

White fir. Stands comprised of 50 percent or more of either white fir or grand fir by cubic volume or number of trees.

Conifer woodland. Sparse stands of low-quality ponderosa pine on lower fringe of timber zone.

Hardwoods. Stands comprised of 50 percent or more of one of the merchantable hardwood species. Does not include stands of scrub oak and madrone.

Nonstocked area. Cut-over or burned-over area on which the restocking, if any, is less than 10 percent density and which does not support a residual stand meeting minimum saw-timber requirements.

Tree Classes

Saw-Timber Tree.

Softwood or hardwood tree 11.0 inches d.b.h. or larger containing at least one 16-foot log to a variable top diameter inside bark approximating 40 percent of diameter breast height, but never less than 8 inches, and in which one-third or more of the gross board-foot volume is free from rot and defect.

Pole-Timber Tree.

Softwood or hardwood tree 5.0 to 10.9 inches d.b.h. in which one-third or more of the gross cubic-foot volume is free from rot and defect.

Cull Tree.

Live tree of saw-timber or pole-timber size that is unmerchantable now or prospectively because of defect or rot.

Stand-Size Classes

Saw-Timber Stand.

Stand of saw-timber trees having a minimum net volume per acre as follows: 5,000 board feet, log scale, Scribner rule, in any conifer species except the pines; 2,000 board feet in any of the pines; 1,000 board feet in hardwoods.

Uncut saw-timber stand. Stand in which cutting, if any, has been so light that no material change in the original forest canopy has occurred.

Partially cut saw-timber stand. Stand remaining after partial-cutting operations.

Old-growth saw-timber stand. Stand in which the majority of the cubic-foot volume is in trees more than about 180 years of age and larger than 21.0 inches d.b.h.

Large young-growth saw-timber stand. Stand in which the majority of the cubic-foot volume is in trees under about 180 years of age and from 21.0 inches to 40.9 inches d.b.h.

Small young-growth saw-timber stand. Stand in which the majority of the cubic-foot volume is in trees under 180 years of age and from 11.0 to 20.9 inches d.b.h.

Pole-Timber Stand.

Stand failing to meet saw-timber-stand specifications but of at least 10-percent stocking of trees 5.0 inches d.b.h. and larger, with at least one-half the minimum stocking in pole-timber trees (5.0 inches to 10.9 inches d.b.h.).

Seedling and Sapling Stand.

Stand not qualifying as either saw-timber or pole-timber stand but having at least 10-percent stocking of trees and with at least one-half the minimum stocking in seedlings and saplings (0 inch to 4.9 inches d.b.h.).

Timber Volume

Live Saw-Timber Volume.

Includes all saw-timber volume except that in dead trees--measured in board feet.

Scribner rule. The common board-foot rule used in determining log-scale volume of saw timber in this region. This rule underestimates, particularly in case of timber of the smaller diameters, the volume of lumber that could be produced from the timber.

International $\frac{1}{4}$ -inch rule. The standard board-foot rule adopted by the Forest Service in the presentation of Forest Survey volume statistics. Volumes in this rule approximate lumber tally.

Primary Growing Stock.

Net volume in cubic feet of live saw-timber trees and live pole-timber trees from stump to a minimum 4.0-inch top inside bark.

Secondary Growing Stock.

Net volume in cubic feet of all cull trees from stump to a minimum 4.0-inch top inside bark.

Salvable Dead.

A dead standing saw-timber tree in which at least one-third of the gross board-foot volume is free from rot or defect and in which sound volume totals at least 30 board feet.

Saw-Timber Volume.

Net volume in feet board measure of saw-timber trees of all species to a merchantable top. Includes both live and salvable dead saw-timber trees (standing and down).

All-Timber Volume.

Net volume in cubic feet of saw-timber trees, pole-timber trees, and cull trees of all species from stump to a minimum 4.0-inch top inside bark. Includes both live and salvable dead saw-timber volume and pole-timber volume.

Species.

Commercial tree species that grow in the Southwest Oregon Unit include:

Softwoods:

Douglas-fir (Pseudotsuga taxifolia).
Ponderosa pine (Pinus ponderosa).
Sugar pine (P. lambertiana).
Western white pine (P. monticola).
Lodgepole pine (P. contorta var. latifolia).
True firs.
Grand fir (Abies grandis).
Noble fir (A. procera).
Shasta red fir (A. magnifica var. shastensis).
White fir (A. concolor).

Hardwoods:

Red alder (Alnus rubra).
Bigleaf maple (Acer macrophyllum).
Tanoak (Lithocarpus densiflorus).
Pacific madrone (Arbutus menziesii).
California black oak (Quercus kelloggii).
Oregon white oak (Q. garryana).
Canyon live oak (Q. chrysolepis).
California laurel (Umbellularia californica).
Golden chinquapin (Castanopsis chrysophylla).

Growth and Mortality

Current Annual Net Growth of Live Saw Timber.

The change during the inventory year in net board-foot volume of live saw timber on commercial forest land resulting from natural causes exclusive of catastrophic losses.

Current Annual Net Growth of Primary Growing Stock.

The change during the inventory year in net cubic-foot volume of the primary growing stock on commercial forest land resulting from natural causes exclusive of catastrophic losses.

Current Annual Normal Mortality of Live Saw Timber.

The net board-foot volume removed from live saw timber during the inventory year through death from natural causes but not as a result of catastrophes.

Current Annual Normal Mortality of Primary Growing Stock.

The net cubic-foot volume removed from primary growing stock during the inventory year through death from natural causes but not as a result of catastrophes.

Commodity Drain

Commodity Drain on Live Saw Timber.

The live saw-timber volume removed through cutting drain and logging waste during the inventory year.

Cutting drain. The live saw-timber volume entering into timber products during the inventory year.

Logging waste. The live saw-timber volume that is cut or killed during the inventory year by logging but not converted to timber products.

Commodity Drain on Primary Growing Stock.

The primary growing stock removed through cutting drain and logging waste during the inventory year.

Cutting drain. The volume of primary growing stock removed through cutting drain and logging waste during the inventory year.

Logging waste. The volume of primary growing stock that is cut or killed during the inventory year by logging but not converted to timber products.

Accuracy of Data

Sampling Error.

A measure of the reliability of timber volume estimates based on the variability shown by sample measurements of the volume.

Standard Error.

An expression of the probability of timber volume estimates being within a specified range of limits around the actual timber volume.